Tuna Newsletter

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National Marine Fisheries Service
- **Southwest Region**
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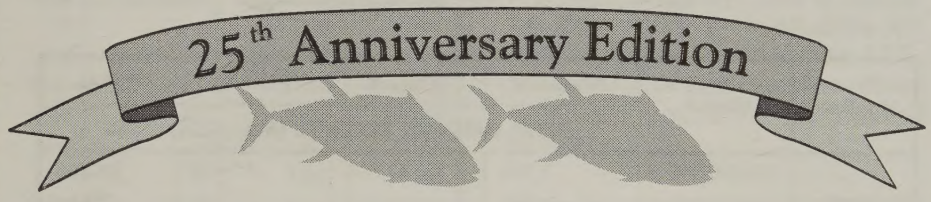

U.S. TUNA STATISTICS

Editor's note: The following articles were prepared by NMFS personnel from data and information gathered from sources in the U.S. tuna industry and government.

U.S. CANNED TUNA INDUSTRY HIGHLIGHTS, THIRD QUARTER 1997

Total receipts of tuna by U.S. canners during the third quarter of 1997 (July-September) decreased by 15% to the equivalent of 121,000 short tons (st) of whole fish (round weight), compared to the third quarter of 1996 (Table 1). The principal species received was skipjack tuna with 45% of the total, followed by albacore and yellowfin tuna with 28% and 27% of the total, respectively. Yellowfin tuna receipts were up by 20%, skipjack tuna receipts were down by 34% and albacore receipts were virtually unchanged.

Receipts for the first three quarters of 1997 totaled 316,200 st, down 11% from the previous year (Table 2). Albacore receipts were up by 3%, skipjack tuna receipts

Table 1. Total U.S. cannery receipts (st) by species for the third quarters of 1996 and 1997. Totals may not add due to rounding.

Jul-Sep	Type	Albacore	Skipjack	Yellowfin[1]	TOTAL
1996	ROUND	32,800	62,400	18,500	113,700
	GILLED & GUTTED	*	0	500	500
	LOIN	200	8,600	3,700	12,500
	TOTAL (as received)	33,000	71,000	22,700	126,700
	TOTAL (round weight)[2]	33,200	81,800	27,400	142,300
1997	ROUND	33,500	43,300	25,700	102,500
	GILLED & GUTTED	0	0	300	300
	LOIN	200	4,800	3,000	8,100
	TOTAL (as received)	33,700	48,100	29,000	110,800
	TOTAL (round weight)[2]	34,000	54,200	32,800	121,000

*Less than 100 st reported for this category.

[1]May include a small amount of bigeye tuna.

[2]Converted to round weight by using factors of 1.11 for gilled-and-gutted and 2.25 for loins.

Table 2. Total U.S. cannery receipts (st) by species for the first three quarters of 1996 and 1997. Totals may not add due to rounding.

Jan-Sep	Source	Albacore	Skipjack	Yellowfin[1]	TOTAL
1996	ROUND	81,200	148,500	51,900	281,500
	GILLED & GUTTED	*	0	1,100	1,100
	LOIN	200	22,100	10,100	32,400
	TOTAL (as received)	81,400	170,600	63,000	315,000
	TOTAL (round weight)[2]	81,700	198,200	75,700	355,500
1997	ROUND	82,700	122,700	53,500	258,900
	GILLED & GUTTED	*	0	800	800
	LOIN	700	14,900	9,400	25,100
	TOTAL (as received)	83,400	137,600	63,800	284,800
	TOTAL (round weight)[2]	84,400	156,200	75,700	316,200

*Less than 100 st reported for this category.

[1]May include a small amount of bigeye tuna.

[2]Converted to round weight by using factors of 1.11 for gilled-and-gutted and 2.25 for loins.

Table 3. U.S. cannery receipts (st) of domestic and imported tuna by species for the third quarters of 1996, 1997 and the recent (1992-96) third quarter averages. Totals may not add due to rounding.

Jul-Sep	Source	Albacore	Skipjack	Yellowfin[1]	TOTAL
		TOTAL CANNERY RECEIPTS (ALL LOCATIONS)			
1996	DOMESTIC	7,700	47,600	11,400	66,700
	IMPORTED	25,300	23,500	11,200	60,000
	TOTAL	33,000	71,000	22,700	126,700
1997	DOMESTIC	5,700	33,700	21,200	60,600
	IMPORTED	28,100	14,400	7,800	50,300
	TOTAL	33,700	48,100	29,000	110,800
1992-96 Average	DOMESTIC	4,200	42,500	14,100	60,700
	IMPORTED	23,900	19,700	7,600	51,200
	TOTAL	28,100	62,200	21,700	112,000

[1]May include a small amount of bigeye tuna.

Table 4. U.S. cannery receipts (st) of domestic and imported tuna by species for the first three quarters of 1996, 1997 and the recent (1992-96) averages. Totals may not add due to rounding.

Jan-Sep	Source	Albacore	Skipjack	Yellowfin[1]	TOTAL
		TOTAL CANNERY RECEIPTS (ALL LOCATIONS)			
1996	DOMESTIC	9,900	101,300	31,500	142,700
	IMPORTED	71,500	69,300	31,500	172,300
	TOTAL	81,400	170,600	63,000	315,000
1997	DOMESTIC	7,300	91,800	41,300	140,400
	IMPORTED	76,200	45,700	22,500	144,400
	TOTAL	83,400	137,600	63,800	284,800
1992-96 Average	DOMESTIC	6,200	110,300	35,200	151,600
	IMPORTED	70,600	62,000	27,800	160,400
	TOTAL	76,800	172,300	63,000	312,100

[1]May include a small amount of bigeye tuna.

were down by 21% and yellowfin tuna receipts were unchanged.

Although the vast majority of tuna received by U.S. canners is whole fish, some quantity is received as loins or gilled-and-gutted. Receipts of tuna loins for the third quarter of 1997 were down by 35%, while receipts of loins for the first three quarters were down by 23%. (Loins and gilled-and-gutted receipts are converted to round weight receipts by factors of 2.25 and 1.11, respectively. For this article, unconverted receipts are used unless otherwise stated.)

Domestic and imported deliveries to U.S. canners for the third quarter of 1997 decreased by 9% and 16%, respectively (Table 3). Skipjack tuna was the largest component of all domestic deliveries at 33,700 st. Domestic deliveries outpaced imports by 10,300 st.

For the first three quarters of 1997, domestic deliveries and imports decreased from the previous year by 2% and 16%, respectively, (Table 4). Imports accounted for 51% of the tuna delivered to U.S. canners

Albacore was the leading import for the third quarter of 1997 at 27,700 st, followed by skipjack and yellowfin tuna at 14,400 st and 7,800 st, respectively (Table 5). The leading supplier was Taiwan, with 50% of the import market, followed by Japan and South Korea with 12% and 7% of the market, respectively.

The western Pacific Ocean was the source of 73% of the tuna received by U.S. canners during the third quarter of 1997 (Table 6). The next greatest sources were the eastern Pacific and western Atlantic oceans, accounting for 16% and 5% of the tuna received by U.S. canners, respectively.

Annual U.S. production of canned tuna totaled 627 million pounds valued at $918.6 million in 1997. This represents decreases of 7% in pro-

Table 5. U.S. cannery imports (st) of tuna by species and source (flag of catcher vessel) for the third quarter of 1997. Totals for the third quarter of 1996 are given for comparison. Note that the flag of the catcher vessel does not necessarily reflect the country of export or point of shipment. Totals may not add due to rounding.

VESSEL FLAG	July-September 1997				1996
	Albacore	Skipjack	Yellowfin[1]	TOTAL	TOTAL
AMERICAN SAMOA	100	0	*	100	*
BELIZE	0	100	100	200	1,100
CANADA	100	0	0	100	100
ECUADOR	0	1,300	600	1,900	3,600
FSM	0	1,000	200	1,200	1,900
FIJI	200	0	0	200	500
GUAM	0	200	0	200	0
HONDURAS	500	0	0	500	900
JAPAN	5,800	100	0	5,900	2,500
NEW ZEALAND	300	0	0	300	400
PANAMA	500	*	100	600	1,000
PAPUA NEW GUINEA	0	400	400	800	200
SOUTH AFRICA	200	*	0	200	200
SOUTH KOREA	1,300	1,800	400	3,500	3,800
TAIWAN	16,300	5,600	2,800	24,800	30,800
TONGA	100	0	0	100	200
URUGUAY	100	0	0	100	100
USA	0	1,100	300	1,400	900
VANUATU	0	1,100	900	2,000	2,200
VENEZUELA	0	300	*	300	*
WESTERN SAMOA	1,000	*	*	1,000	300
UNKNOWN	1,000	1,300	2,000	4,300	200
OTHER	100	0	0	100	9,000
TOTAL	27,700	14,400	7,800	49,900	60,000

*Less than 100 st reported for this category.

[1]May include a small amount of bigeye tuna.

Table 6. Receipts (st) of tuna by U.S. canneries by species and area of capture for the third quarters of 1996 and 1997. Totals may not add due to rounding.

SOURCE	Albacore		Skipjack		Yellowfin[1]	
	1996	1997	1996	1997	1996	1997
E. ATLANTIC OCEAN						
DOMESTIC	0	0	0	0	0	0
IMPORTED	4,000	3,800	1,200	*	600	0
TOTAL	4,000	3,800	1,200	*	600	0
W. ATLANTIC OCEAN						
DOMESTIC	0	0	0	0	0	0
IMPORTED	4,700	5,300	*	0	*	0
TOTAL	4,700	5,300	*	0	*	0
E. PACIFIC OCEAN						
DOMESTIC	5,800	3,400	2,200	3,900	5,500	4,900
IMPORTED	100	200	4,000	3,600	5,600	2,100
TOTAL	5,900	3,600	6,200	7,500	11,000	7,000
W. PACIFIC OCEAN						
DOMESTIC	1,900	2,300	45,400	29,800	5,900	16,300
IMPORTED	13,800	16,600	18,200	10,600	3,100	5,500
TOTAL	15,700	18,800	63,600	40,500	9,000	21,900
INDIAN OCEAN						
DOMESTIC	0	0	0	0	0	0
IMPORTED	2,600	2,300	100	200	2,000	200
TOTAL	2,600	2,300	100	200	2,000	200

*Less than 100 st reported for this category

[1]May include a small amount of bigeye tuna.

duction and 4% in value from the 1996 annual figures. Light meat accounted for 442 million pounds in 1997 (down by 68 million pounds) and white meat accounted for 185 million pounds (up by 20 million pounds).

U.S. TUNA FISHERIES UPDATE

EASTERN PACIFIC TROPICAL TUNA FISHERY

During the period January through March 1998, the U.S. tropical tuna fleet in the eastern Pacific caught an estimated 3,200 metric tons (mt) of yellowfin tuna, 2,600 mt of skipjack tuna and 400 mt of bigeye tuna (Figure 1). The yellowfin tuna catch was up 6%, the skipjack tuna catch was down 13%, and the bigeye tuna catch was down 61% compared to the same period in 1997.

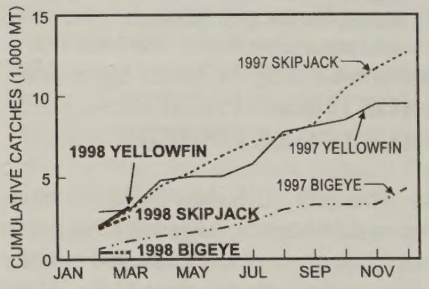

Figure 1. Cumulative catches, by month, for the U.S. eastern tropical Pacific tuna fleet, 1997 and 1998. (Note that data are not available for January.)

The surface fleets (purse seiners and baitboats) of all nations fishing in the eastern tropical Pacific Ocean caught an estimated 51,700 mt of yellowfin tuna, 26,300 mt of skipjack tuna and 7,200 mt of bigeye tuna. The leading nation was Mexico with 33% of the total catch, followed by Ecuador with 21% and Venezuela with 17%. The U.S. fleet accounted for 7% of the tuna catch.

WESTERN PACIFIC TROPICAL TUNA FISHERY

For the period January through March 1998, U.S. tuna purse sein-

ers fishing in the western tropical Pacific landed an estimated 21,100 mt of skipjack tuna and a combined 16,300 mt of yellowfin and bigeye tuna (Figure 2). The skipjack tuna landings were down 22% and the combined yellowfin and bigeye tuna landings were up 126% from the 1997 landings for the same period. Thirty-one vessels landed tuna from 43 trips for this period of 1998 compared to 31 vessels and 37 trips in 1997. *(Report provided by Doug Prescott, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

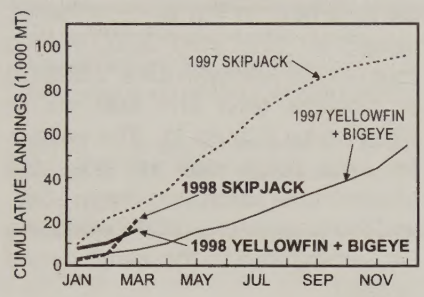

Figure 2. Cumulative tuna landings, by month, for the U.S. western tropical Pacific purse seine fishery, 1997 and 1998.

NORTHERN PACIFIC ALBACORE FISHERY

The 1997 U.S. North Pacific albacore troll season began in May north of Midway Island and ended in early November along the U.S. West Coast. Numerous schools of albacore were scattered throughout the offshore fishing areas but high daily catches were sporadic. Abnormal ocean temperatures were prevalent throughout the North Pacific fishing areas. Water temperatures in the offshore areas (1,000-2,000 miles off Oregon) were as much as 2.2°C below normal, while coastal water temperatures were abnormally warm. Albacore landings for the 1997 fishery totaled 11,550 mt, compared to 15,600 mt landed in 1996.

The average weight of troll-caught albacore was approximately 6.7 kg. Large numbers of small fish (3.5-4.5 kg) began appearing in catches in mid-season. Transshipment vessels made four trips from the grounds to the canneries in American Samoa. One NMFS observer accompanied a troll vessel to collect fisheries and research information.

Many changes resulted from a large influx of vessels into the fishery. Several U.S. ports are now available for Canadian vessels to land their fish, and several Canadian ports are available to U.S. boats. Voluntary daily radio reports on fishing conditions were sharply curtailed due to crowding of vessels in areas where radio reports announced high catches. Several vessels reported high numbers of gillnet-scarred fish. Two illegal high-seas driftnet vessels were sighted by the fleet and reported to the U.S. Coast Guard. *(Report provided by John Childers, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

SOUTHERN PACIFIC ALBACORE FISHERY

The 1997-98 U.S. South Pacific albacore troll fishery began in December 1997. Approximately 25 to 30 U.S. troll vessels participated in the South Pacific this season which by late March was coming to a close. The fishing grounds extend from approximately 140°W to 160°W along 40°S latitude. Accurate reports of catches are not yet available. Preliminary reports, however, indicate poor catches for the season. Several vessels sold their catch to a cannery in Fiji due to lower prices in American Samoa.

Two fishing vessels departed from Chile and collected data on the ocean structure and fishing conditions in the southeast Pacific for the American Fisherman's Research Foundation (AFRF). Logbooks and length-frequency data for this fishery are collected by the NMFS/SWR field office in Pago Pago, American Samoa. *(Report provided by John Childers, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

WESTERN ATLANTIC BLUEFIN TUNA FISHERY

The NMFS has proposed 1998 quota guidelines for the Atlantic bluefin tuna (ABT) fishery and fishing effort controls for the General category fishery. These proposed measures are generally consistent with those implemented for 1997.

NMFS proposes that no changes be made to the baseline quotas established for 1997 and that underharvest from 1997 be added to the respective quota categories. Therefore, the proposed specifications for 1998 would be as follows (see Table 7): Reserve 52 mt, Purse Seine category quota 250 mt, Incidental category quota 114 mt, General category quota 657 mt, Harpoon category quota 53 mt, and Angling category quota 277 mt. Geographical subdivision of the Angling and Incidental quotas are in the same proportion as in 1997.

As in 1997, NMFS proposes three General category subquotas for 1998, based upon historical catch patterns (1983-96) and distributed as follows: 60% for June-August, 30% for September, and 10% for October-December. These percentages would be applied only to the adjusted coastwide General category of 647 mt, with the remaining 10 mt being reserved for the New York Bight fishery in October. Thus, of the 647 mt, 388 mt would be available in the period beginning June 1 and ending August 31, 194 mt would be available in the period beginning September 1 and ending September 30, and 65 mt would be available in the period beginning October 1 and ending December 31.

The proposed specifications for 1998 include a fishing effort control schedule similar to that used in the 1997 season, including restricted-fishing days. Persons aboard vessels permitted in the General category would be prohibited from fishing (including tag and release fishing) for ABT of all sizes on the

Table 7. Proposed 1998 U.S. Atlantic bluefin tuna quotas by category.

	1995 Base Quotas[b]	Initial 1997 Quotas	Adjusted 1997 Quotas	1997 Under-harvest	Proposed Annual Quotas[c]	Proposed Adjusted 1998 Quotas[d]
General	**531**	**633**	**703**	**24**	**633**	**657**
Harpoon	**53**	**53**	**53**	**0**	**53**	**53**
Incidental	**110**	**110**	**53**	**4**	**110**	**114**
Other	1	1	1		1	1
Longline	109	109	52		109	113
North	23	23	20		23	24
south	86	86	32		86	89
Purse Seine	**250**	**250**	**250**	**0**	**250**	**250**
Angling	**222**	**265**	**265**	**12**	**265**	**277**
School[a]	100	108	108		108	108
North	53	57	57		57	57
South	47	51	51		51	51
Large School/ Small Medium	119	151	151	10	151	161
North	-	-	80		80	85
South	-	-	71		71	76
Trophy	3	6	6	2	6	8
North	-	2	2		2	3
South	-	4	4		4	5
Reserve	**145**	**33**	**20**	**19**	**33**	**52**
Total	**1,311**	**1,344**	**1,344**	**59**	**1,344**	**1,403**

[a]ICCAT 1996 recommendation limits the annual school size class subquota to 8% of annual U.S. allocation.
[b]Actual 1995 quotas included adjustments to base due to overharvest/underharvest in 1994.
[c]Proposed annual quotas are identical to the 1997 initial quotas.
[d]Proposed 1998 adjusted quotas include addition of underharvest in 1997.

following days: July 15, 16, 22, and 29; August 2, 5, 9, 11, 12, 13, 16, 19, 23, 26, and 30; and September 2, 6, 9, 13, 16, 19, 20, 23, 27, and 30. These dates generally correspond to Japanese market closures. *(Report provided by Pat Scida, NMFS Northeast Region, Gloucester, MA)*

REPORTS

Editor's note: Original reports are published as a service to subscribers and may not represent the views of the NMFS. Readers should contact the authors of reports for details, if needed.

OCEAN CONDITIONS DURING EL NIÑO IN THE EASTERN TROPICAL PACIFIC

Forrest R. Miller, Inter-American Tropical Tuna Commission, 8604 La Jolla Shores Drive, La Jolla, California 92037-1508

The El Niño of 1982-1983 and others which followed have received more notoriety and media attention than almost any other weather/ocean phenomenon. These El Niño events have been blamed for periods of great destruction and adversity on a global scale.

Historically, the term "El Niño" describes a rapid warming of the ocean surface layer off the coasts of Colombia, Ecuador and Peru during the austral summer. The Christmas-time seasonality of this warm-water event has, since 1982, created a popular belief that El Niño refers to the Christ Child. This association seems somewhat questionable, because Christmas is a time of rejoicing and celebration. Instead, El Niño brings torrential rains, flooding and extreme hardship, loss of life, and poor fishing especially in the coastal regions of Ecuador and Peru.

It is more probable that the name "El Niño" originated from the narrow, south-setting ocean current along the coast of Ecuador, called by early seafarers "Corriente del Niño". The name was probably shortened later. This current appears at the surface only when the very broad, wind-driven Peru Current weakens and shifts more offshore during a warm-water episode. El Niño is, in fact, just one manifestation among many of a global shift in the atmospheric/oceanic circulations from their normal patterns.

The high productivity of the eastern tropical Pacific Ocean (ETP) is due, in large part, to prevailing easterly winds and to prevailing currents which induce upwelling of cooler and nutrient-rich subsurface waters, especially along the equator out to 160°W from 5°N to 5°S and along the west coast of South America. Periodically, the strength of the tropical easterly winds decreases in the central and eastern tropical Pacific Ocean, and this leads to reduced upwelling, higher-than-normal sea-surface temperatures (SSTs), higher recorded sea levels at coastal stations, deeper thermoclines, and changes in the distributions and amounts of rainfall in various areas of the ETP.

The thermocline is the layer where temperature and oxygen levels decrease rapidly with depth, beneath the mixed surface layer. Periods when these conditions prevail are called El Niño episodes. The effects of an El Niño event are usually most pronounced in the ETP between approximately 5°N and 15°S, but during strong episodes, such as those of 1972-1973, 1982-1983 and 1997-1998, these effects can extend poleward as far as 40°N and 30°S and persist in the ETP for 12 to 18 months.

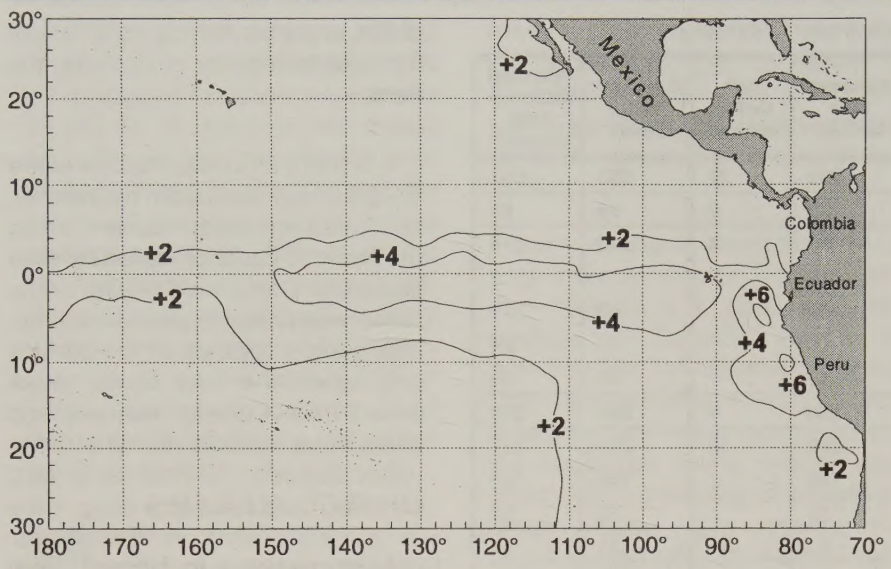

Figure 3. Departures of SSTs from long-term normals (anomalies) for November 1997, based on data from fishing boats and other types of commercial vessels.

During the first quarter of 1997 the SSTs remained slightly below normal over the equatorial region of the ETP, but in the offshore region west of southern Peru and northern Chile the SSTs were anomalously 1° to 2°C (1.8° to 3.6°F) above normal, and in the western tropical Pacific there was a widespread increase in the positive SST anomalies of about 1°C.

The average Southern Oscillation Index (SOI) for the first quarter was +1.0, above normal, but also with a downward trend. The SOI is the difference between atmospheric pressure at Tahiti, French Polynesia and Darwin, Australia, and is a measure of the strength of the tropical easterly wind circulation, especially in the ETP of the southern hemisphere. Negative SOIs are associated with a weak surface wind circulation and El Niño conditions. The easterly winds thus were weakening, especially in the western tropical Pacific.

During the second and third quarters of 1997 there was a rapid transition from near-normal to above-normal SSTs in the ETP. By the end of June the SSTs had become 3°to 5°C (5.4° to 9.0°F) above normal along the coast of Peru and 1°to 2°C (1.8 to 3.6°F) above normal along the equator from the Galapagos Islands out to 135°W. During the third quarter the El Niño appeared to have reached its maximum intensity with SSTs of 4° to 6°C above normal off the coast of Peru and southwest of the Galapagos Islands.

In the ETP the sea level rose rapidly to as much as 20 cm (8 inches) above normal and the depth of the thermocline increased to 70 to 80 m, which was 20 to 40 m deeper than its normal depth east of 150°W and between 10°N and 10°S. These oceanic conditions persisted through the northern summer months of 1997. The El Niño episode of 1997-98, developing in mid-year 1997 with large positive SST anomalies, was similar to the strong El Niño of 1976-1977 and the very strong El Niño of 1982-1983, both of which also began during the second quarter. The SOI, which averaged -1.6 during the third quarter, reached a minimum of -2.1 in August.

During the fourth quarter of 1997 the El Niño finally reached its maximum intensity for 1997, with SST anomalies of 5°to 7°C (9°to 13°F) above normal off the coasts of Ecuador and Peru. The anomaly pattern for the ETP is shown in the SST anomaly chart for November 1997 (Figure 3). SSTs more than 2°C above normal extended westward to 160°W along the equator and northward to 10°N east of 105°W in December 1997. The large expanse of SSTs more than 4°C (7.2 °F) above normal is characteristic of the other months of this quarter and the first quarter of 1998. The SSTs of 6°to 7°C (11°to 13°F) above normal off Peru in December were the greatest anomalies recorded in 1997; they were also greater than in December 1982. Sea levels of 25 to 35 cm (10 to 14 inches) above

UPCOMING TUNA MEETINGS

(Organizer; meeting type: sci=science, adm=administration)

- May 11-15. Workshop on Abundance Indices for Tropical Tuna Surface Fisheries. Miami, FL. (ICCAT; sci)
- May 18-21. 49th International Tuna Conference. Lake Arrowhead, CA. (NMFS; sci)
- JUN 1-6. Meeting of the Standing Committee on Tuna and Billfish. Honolulu, HI. (South Pacific Commission; sci)
- JUN 7-11. Inter-American Tropical Tuna Commission annual meeting. La Jolla, CA. (IATTC; adm)
- SEP 14-23. International Commission for the Conservation of Atlantic Tunas (ICCAT), Bluefin Tuna Assessment Workshop. Genoa, Italy. (ICCAT; sci)
- OCT 12-19. ICCAT/SCRS meetings. Madrid, Spain. (ICCAT; sci)
- NOV 16-24. ICCAT Annual Meeting. Santiago, Spain. (ICCAT; adm)

normal were recorded at coastal stations from Panama to central Peru, and the thermocline in the ETP was about 30 m to 60 m (15 to 35 fathoms) deeper than normal. The average SOI for October, November and December remained at -1.6, reflecting continued weak surface wind circulation over most of the equatorial Pacific.

Because the El Niño of 1997-1998 was so extensive and strong during the last half of 1997 and the first quarter of 1998, this very warm-water episode will probably remain strong in the ETP until mid-year 1998 with positive SST anomalies of 2°to 3°C (3.6° to 5.4 °F), higher-than-normal sea levels, and deeper-than-normal thermoclines. The El Niño of 1997-1998 may go into the record book as the strongest in this century, and it is likely be the last of this millennium.

RECENT SWFSC PUBLICATION

Editor's note: An abstract from a recently published paper written by a SWFSC scientist is presented in this space to announce its availability and to report results of tuna research conducted by Center staff.

BLOOD VOLUME, PLASMA VOLUME AND CIRCULATION TIME IN A HIGH-ENERGY DEMAND TELEOST, THE YELLOWFIN TUNA (*THUNNUS ALBACARES*)

Richard W. Brill[1], Katherine L. Cousins[1], David R. Jones[1,2], Peter G. Bushnell[1,3] and John F. Steffensen[1,4] Published in The Journal of Experimental Biology *201, 647-654 (1998)*

We measured red cell space with ^{51}Cr-labeled red blood cells, and dextran space with 500 kDa fluorescein-isothiocyanate-labeled dextran (FITC-dextran), in two groups of yellowfin tuna (*Thunnus albacares*). Red cell space was 13.8 ±0.7ml kg^{-1} (mean ±S.E.M.) Assuming a whole-body hematocrit equal to the hematocrit measured at the ventral aortic sampling site and no significant sequestering of ^{51}Cr-labeled red blood cells by the spleen, blood volume was 46.7 ±2.2 ml kg^{-1}. This is within the range reported for most other teleosts (30-70ml kg^{-1}), but well below that previously reported for albacore (*Thunnus alalunga*, 82-197 ml kg^{-1}). Plasma volume within the primary circulatory system (calculated from the ^{51}Cr-labeled red blood cell data) was 32.9 ±2.3ml kg^{-1}. Dextran space was 37.0 ±3.7 ml kg^{-1}. Because 500 kDa FITC-dextran appeared to remain within the vascular space, these data imply that the volume of the secondary circulatory system of yellowfin tuna is small, and its exact volume is not measurable by our methods. Although blood volume is not exceptional, circulation time (blood volume/cardiac output) is clearly shorter in yellowfin tuna than in other active teleosts. In a 1 kg yellowfin tuna, circulation time is approximately 0.4 min (47 ml kg^{-1}/115 ml min^{-1} kg^{-1}) compared with 1.3 min (46 ml kg^{-1}/35 ml min^{-1} kg^{-1}) in yellowtail (*Seriola quinqueradiata*) and 1.9 min (35 ml kg^{-1}/18 ml min^{-1} kg^{-1}) in rainbow trout (*Oncorhynchus mykiss*). In air-breathing vertebrates, high metabolic rates are necessarily correlated with short circulation times. Our data are the first to imply that a similar relationship occurs in fishes.

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RECENT DEVELOPMENTS IN TUNA FISHERIES

Editor's note: The following news items, compiled from fishery trade and industry journals, newspapers and NMFS reports, are provided only as a service to our readers. The NMFS does not guarantee their accuracy.

UNITED STATES

Tuna Tagging in Hawaii: The Pelagic Fisheries Research Program of the University of Hawaii will be tagging bigeye and yellowfin tunas throughout the Hawaii EEZ for the next two years. While most recaptures will likely occur close to the point of release, some long-range and long-term recaptures are expected, particularly for bigeye tuna. The PFRP is using 11-cm orange plastic dart tags manufactured by Hallprint that bear the message: Hawaii Tagging Program; for Reward Call 1 (800) 588-8066. The toll-free telephone number will connect the caller to a program message phone when dialed from anywhere within the U.S. The best way to report recaptures from outside the U.S. is to contact David Itano or Kim Holland by e-mail, facsimile or air mail at the numbers and address listed below.

As with any tagging program, the PFRP must verify recaptures with receipt of the tag and request recapture information giving the tag number, fish species, fork length, fishing gear type and the date and location of the catch with finder name and address. Any additional information, such as vessel identity and fish condition would be appreciated. The PFRP is offering an attractive program T-shirt as reward for all recaptures and will supply the finder with information on the distance traveled, time at liberty and growth rate if sufficient recapture details are pro-

vided. Contact: David Itano *(ditano@soest.hawaii.edu); fax, 1-808-956-4104 or Kim Holland (kholland@hawaii.edu); fax, 1-808-236-7443, Hawaii Institute of Marine Biology, P.O. Box 1346, Kaneohe, Hawaii 96744, U.S.A.*

Dolphin Protection Agreement: On February 8, 1998, the 12-nation Inter-American Tropical Tuna Commission reached agreement on negotiated measures for the eastern Pacific tuna fishery to reduce bycatch, conserve tuna stocks, differentiate between dolphin-safe tuna and other tuna, provide incentives to improve tuna skipper performance, strengthen enforcement measures, and protect and promote recovery of dolphin stocks. (Center for Marine Conservation press release)

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